

CLAIMS

What is claimed is:

1. A muscle actuator comprising an inner bladder comprising a first end and a second end and the inner bladder being configured to communicate with a pneumatic source, a braided material wrapped over at least a substantial portion of the inner bladder, an end fitting attached to both the first end and the second end, and a helical coil spring positioned over at least a portion of the braided material or inside the inner bladder.
2. The muscle actuator of claim 1, further comprising a control mechanism for controlling the amount of flow of the pneumatic source into and out of the inner bladder.
3. The muscle actuator of claim 1, wherein the helical coil spring is positioned over at least a portion of the braided material.
4. The muscle actuator of claim 3, wherein the helical coil spring comprises two ends, and wherein one of the two ends is mechanically coupled to a clamping device.
5. The muscle actuator of claim 4, further comprising an elongated shell positioned over at least a portion of the braided material and wherein the clamping device is clamped to the elongated shell.
6. The muscle actuator of claim 5, wherein the elongated shell comprises two individual shell members in telescoping relationship with one another.
7. The muscle actuator of claim 6, further comprising a second clamping device mechanically coupled to the second end of the helical coil spring.
8. The muscle actuator of claim 1, wherein the helical coil spring is positioned over at least a portion of the braided material, and wherein an elongated shell is positioned over the helical coil spring.
9. The muscle actuator of claim 8, wherein the spring comprises two ends, and wherein a disc comprising an opening is mechanically coupled to one of the ends.

10. A muscle actuator comprising an inner bladder comprising a first end and a second end and the inner bladder being configured to communicate with a pneumatic source, a braided material wrapped over at least a substantial portion of the inner bladder, an end fitting attached to both the first end and the second end, and a mechanical device capable of receiving a compression force and generating a pushing force when the compression force is removed mounted in parallel with the muscle actuator.

11. The muscle actuator of claim 10, wherein the mechanical device is a shock absorber.

12. The muscle actuator of claim 11, wherein the shock absorber is a compression gas spring-type shock absorber.

13. The muscle actuator of claim 11, wherein the shock absorber is a locking compression gas spring-type shock absorber.

14. The muscle actuator of claim 10, wherein the mechanical device is a helical spring.

15. The muscle actuator of claim 14, wherein the helical spring is mounted over the muscle actuator.

16. The muscle actuator of claim 14, wherein the helical spring is mounted inside the inner bladder.

17. The muscle actuator of claim 14, wherein the helical spring is mounted adjacent the muscle actuator.

18. The muscle actuator of claim 17, wherein the helical spring includes an adjustment clamp.

19. The muscle actuator of claim 10, further comprising a second muscle actuator mounted in parallel and spaced apart from one another.

20. The muscle actuator of claim 19, further comprising a knee brace, wherein one of the ends of each of the muscle actuator is mechanically coupled to the knee brace.

21. The muscle actuator of claim 14, wherein the helical spring comprises two clamping devices.

22. The muscle actuator of claim 21, wherein the two clamping devices are clamped to a telescoping structure.

23. The muscle actuator of claim 22, wherein telescoping structure comprises a starting position, and wherein the two clamping devices clamp the helical spring in a compressed positioned when the telescoping structure is in the starting position.

24. The muscle actuator of claim 22, wherein telescoping structure comprises a starting position, and wherein the two clamping devices clamp the helical spring in a stretched position when in the starting position.

25. The muscle actuator of claim 10, further comprising a second muscle actuator comprising a second mechanical device mounted in parallel with the muscle actuator, wherein the muscle actuator and the second muscle actuator are positioned on two different sides of a pivoting member.

26. The muscle actuator of claim 25, wherein the pivoting member is a pivot joint.

27. The muscle actuator of claim 10, further comprising a second muscle actuator comprising a second mechanical device mounted in parallel with the muscle actuator, wherein the muscle actuator and the second muscle actuator are both coupled to a knee brace.

28. The muscle actuator of claim 10, wherein the two end fittings of the muscle actuator are attached to a structure comprising a pivot arm; and wherein the mechanical device is also attached to the same structure with the pivot arm.

29. The muscle actuator of claim 10, further comprising a second mechanical device mounted in parallel with the muscle actuator.

30. The muscle actuator of claim 29, wherein the muscle actuator and the two mechanical devices are mounted to two flanges.

31. The muscle actuator of claim 10, further comprising a second muscle actuator, a third muscle actuator, and a fourth muscle actuator, each of the second through fourth actuator comprising a mechanical device mounted in parallel with the muscle actuator, wherein the muscle actuator and the second muscle actuator are positioned on two different sides of a first pivoting member, and wherein the third muscle actuator and the fourth muscle actuator are positioned on two different sides of a second pivoting member.

32. The muscle actuator of claim 31, wherein the first pivoting member and the second pivoting member are pivot joints.

33. A combination pneumatic actuator muscle and a mechanical device capable of receiving a compression force and generating a pushing force when the compression force is removed mounted to a first surface and a second surface,

wherein a passage is incorporated in a header of the pneumatic actuator muscle for receiving a pressurized source,

wherein the pneumatic actuator muscle produces a pulling force to compress the mechanical device when the pressurized source enters the pneumatic actuator muscle; and

wherein the mechanical device generates a pushing force when the pressurized source is discharged from the pneumatic actuator muscle.

34. The combination pneumatic actuator muscle and mechanical device of claim 33, wherein the mechanical device is a shock absorber.

35. The combination pneumatic actuator muscle and mechanical device of claim 34, wherein the shock absorber is a locking compression gas spring-type shock absorber.

36. The combination pneumatic actuator muscle and mechanical device of claim 33, wherein the mechanical device is a helical spring.